

Care of the Patient on a Ventilator

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Artificial Airways

A means to protect the airway

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Artificial Airways

- Endotracheal Tubes (ET Tube or ETT)
 - Oral Intubation: tube inserted into the trachea through mouth & vocal cords.
 - Airway can be secured rapidly
 - Larger bore tube can be used
 - Easier to remove secretions
 - Bite block needed

Artificial Airways (cont'd)

- Nasal Intubation: tube passed through the nose, nasopharynx & vocal cords.
 - Is stable
 - Difficult to dislodge
 - Can be placed without visualizing larynx, so no head/neck manipulation needed
 - Disadvantage: only small tube can be used

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Tracheostomy Tube

- Used if artificial airway will be needed for a long time (more than 4-6 weeks)
- Patient comfort maximized, Pt. able to eat and speak with certain types of trach tubes
- Suctioning is easier & work of breathing is less than with ETT

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OUR GOAL TO PROTECT THE AIRWAY IS.....

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Intubate Early & Secure the Tube!!



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Responsibilities

- Daily oral care
- Check skin under tube holder or tape
- Check position of E.T. tube via X-Ray
 - 2 cm above carina
- Document length of tube @ teeth
 - 22 - 24 cm for adult

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Avoid Nosocomial Infections

- HOB @ 45 degrees
- Suction only if indicated
- Lavage only if indicated
- Sedation Holiday
- Early Weaning

Mechanical Ventilation

- Is the process by which oxygen enriched air is moved *into* and *out* of the lungs by mechanical means
- It is a way of supporting patients' respirations until they have the ability to breathe independently

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Indications

- Inability to oxygenate
- Inability to ventilate
- To decrease the work of breathing

Respiratory Criteria

- Mechanics
 - Respiratory Rate >35/min
 - Tidal Volume <4ml/kg
 - Inspiratory Force <25cmH2O
 - Vital Capacity <15ml/kg

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Arterial Blood Gases

- ABG
 - PaO2 <50mmHg
 - PaCO2 >55mmHg
 - P(A-a)O2 approx.>300 (FiO2)
 - pH<7.20-7.30

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Clinical Signs

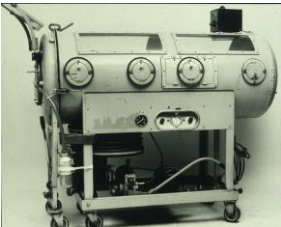
- Clinical Signs
 - Increased work of breathing
 - Inability to clear secretions
 - Poor general clinical status

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EARLY TYPE OF VENTILATORS....

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Iron Lung



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Rancho Los Amigos ICU (1950s)



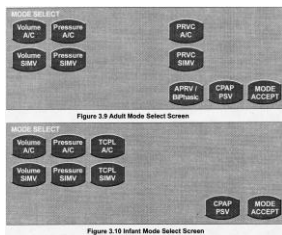
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Chest Curass



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Features of the Ventilator



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Face of the AVEA VIASYS used in ICU at LAC/USC



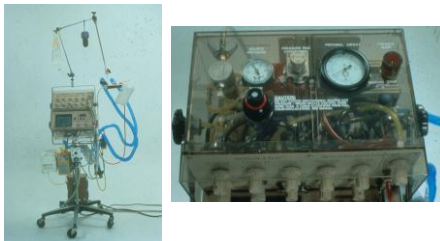
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Ventilator: AVEA VIASYS



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High Frequency Percussive Ventilator



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MODES OF VENTILATION

MODES OF VENTILATION FEATURES

- A/C – Assist/Control
- SIMV – Synchronized Intermittent Mandatory Ventilation
- PS – Pressure Support

MODES OF VENTILATION FEATURES

Volume-Control Ventilation [A/c SIMV/PS]

- Delivers predetermined volume of gas irrespective of lung pressures
- When volume is reached the inspiration is terminated
- The most common form of long-term ventilatory support

Pressure-Control Ventilation (PC) [A/C SIMV/PS]

- Gas flows into lungs until predetermined pressure reached
 - When pressure reached inspiration ends
- Tidal volume varies
- Ideal mode of vent to reduce risk of lung barotrauma ie., ARDS, ALI, BPF

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Pressure Regulated Volume Control (PRVC) [A/C SIMV/PS]

- Delivers a set tidal volume at lowest peak pressure level
- Delivers decelerating inspiratory flow
- Ideal for lung injuries or peds
- Ideal for patients with asthma
- Post op patients

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Positive End Expiratory Pressure (PEEP)

- Airway pressure at the end of expiration remains positive
- Used with any mode of supportive ventilation
- Recruits alveoli and improves oxygenation

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Airway Pressure Release Ventilation (APRV), Bi-Phasic

- Is an Inverse I:E ventilation with both inhalation & exhalation valve that are actively opened by patient
- Pt can be fully controlled on vent or breath spontaneously
- Used for ARDS or difficulty in weaning
- No chemical paralyzing needed

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Continuous Positive Airway Pressure (CPAP/PS)

- Pt breathes spontaneously
- Airway pressures are positive throughout resp cycle
- Increases functional residual capacity, decreases shunting & work of breathing
 - Helps re-expand atelectatic lung
- Often used in weaning process
- PS can be implemented in order to augment spontaneous Vt

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Weaning (Liberation)

- Is the process of the progressive withdrawal of mechanical ventilatory support and final extubation
- Respiratory Care Practitioner will carry out the weaning process and record the values onto the flowsheet for MD to evaluate
- Sedation holiday

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Criteria for Weaning

- Patient should be hemodynamically, metabolically, and electrolytically stable
- No pharmacological paralysis or excessive sedation
- Respiratory rate < 25/min, tidal volume more than 4-6ml/kg

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Weaning Methods

- SIMV/Pressure Support
- CPAP/Pressure Support
- Pressure Support/Volume Support
- T-piece

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Nursing Be Aware

- Keep your auditory sense aware to any alarm that goes off on ventilator
- Always check your patient FIRST, then check machine and tubing
- NEVER turn off or silence alarms

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Nursing Responsibilities

- Assessment of ETT, Trach Care, or Oral Care (Hygiene)
- RN must ensure that manual resuscitation bag is at the bedside
 - » When ventilator function is in doubt, remove pt. from vent and bag with 100% O₂ and notify RT & MD
- Auscultate (suction only as needed)
- Lavage only with thick tenacious secretions
- Inform MD of ABG results

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Nursing Responsibilities

- Ventilator Settings
 - Check settings with orders and kardex at onset of shift
 - Know who your RCP is and phone #
 - Clarify discrepancies between orders and actual settings
 - Assess need for ABGs after any setting changes

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Alarms

- High Pressure Alarm
 - High pressure with system, obstruction to incoming airflow
 - Tubing kinked, ETT occluded, ↑ secretions, coughing, ↓ lung compliance
- Low Pressure Alarm
 - Loss of pressure in system
 - Tube disconnected, cuff leak or underinflated

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Respiratory Care Practitioner (RCP) Responsibilities

- Assessment of ETT, trach care & assist retape ETT
- Initial set-up
- Setting changes
- Equipment maintenance, assist in suctioning regime
- Monitoring, measuring, and recording ventilatory criteria at least every 2 hours and prn
- Teamwork!!

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THANK - YOU

THE END...